
GEOSPATIAL INFORMATION TECHNOLOGY
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GEOSPATIAL TECHNOLOGY EXPERTS
FRONTIER PRECISION
GISITR 2015

New Hardware Technology for High Accuracy GIS Data Collection

Presented by,

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Geospatial Solutions
Frontier Precision, Inc.

Who is Frontier Precision?

Trimble

SPECTRA PRECISION

seco

LASER TECHNOLOGY INC
Measurably Superior®

Learning Objectives:

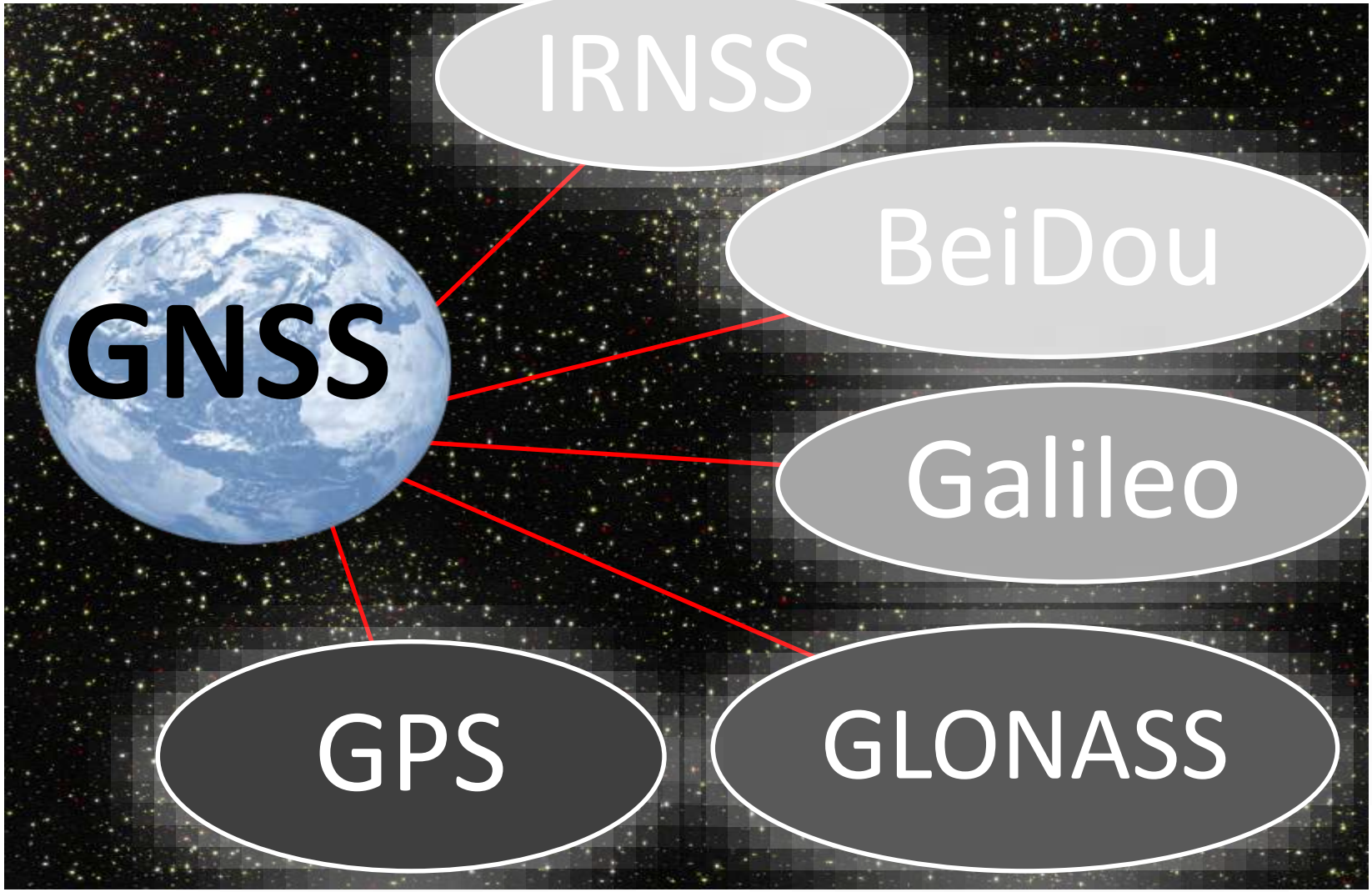
- What is GNSS
- Differential Correction
- Corrected and Uncorrected GNSS Data
- Real-time Corrections
- High accuracy with Smart-Phones and Tablets

What is GNSS

GNSS stands for:

Global **N**avigation **S**atellite **S**ystem – it's a generic term for all satellite navigation systems. What used be known as "GPS"

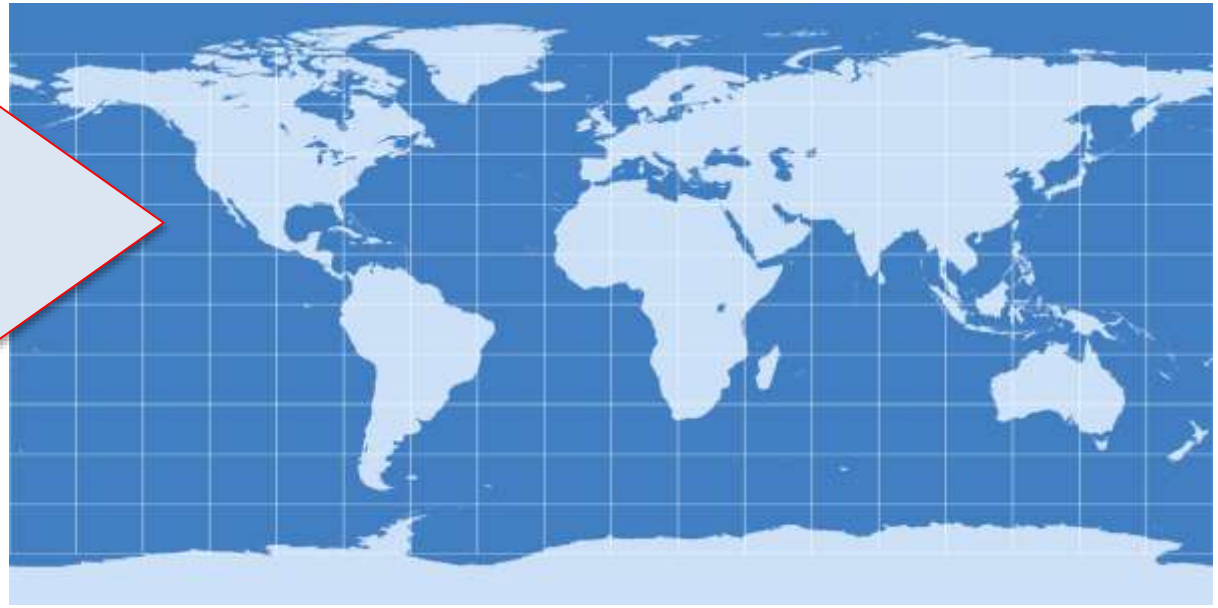
GNSS is the global term for all Satellite Navigation Systems



Autonomous Position

An Autonomous position is an uncorrected position acquired by your receiver.

10-15 Meters of Accuracy



How do location services work on a smart device?

Hybrid Positioning Services

- Assisted GPS (A-GPS)
  - ~ 5-8 m
- Wi-Fi Positioning
  - ~ 74 m
- Cellular Network Positioning
  - ~ 600 m

Zandbergen, P. A." Accuracy of iPhone locations: A comparison of Assisted GPS, Wifi and cellular positioning." Transactions in GIS, 13, 5–25

The need for Higher Accuracy for Professional Data Collection

Differential Corrections

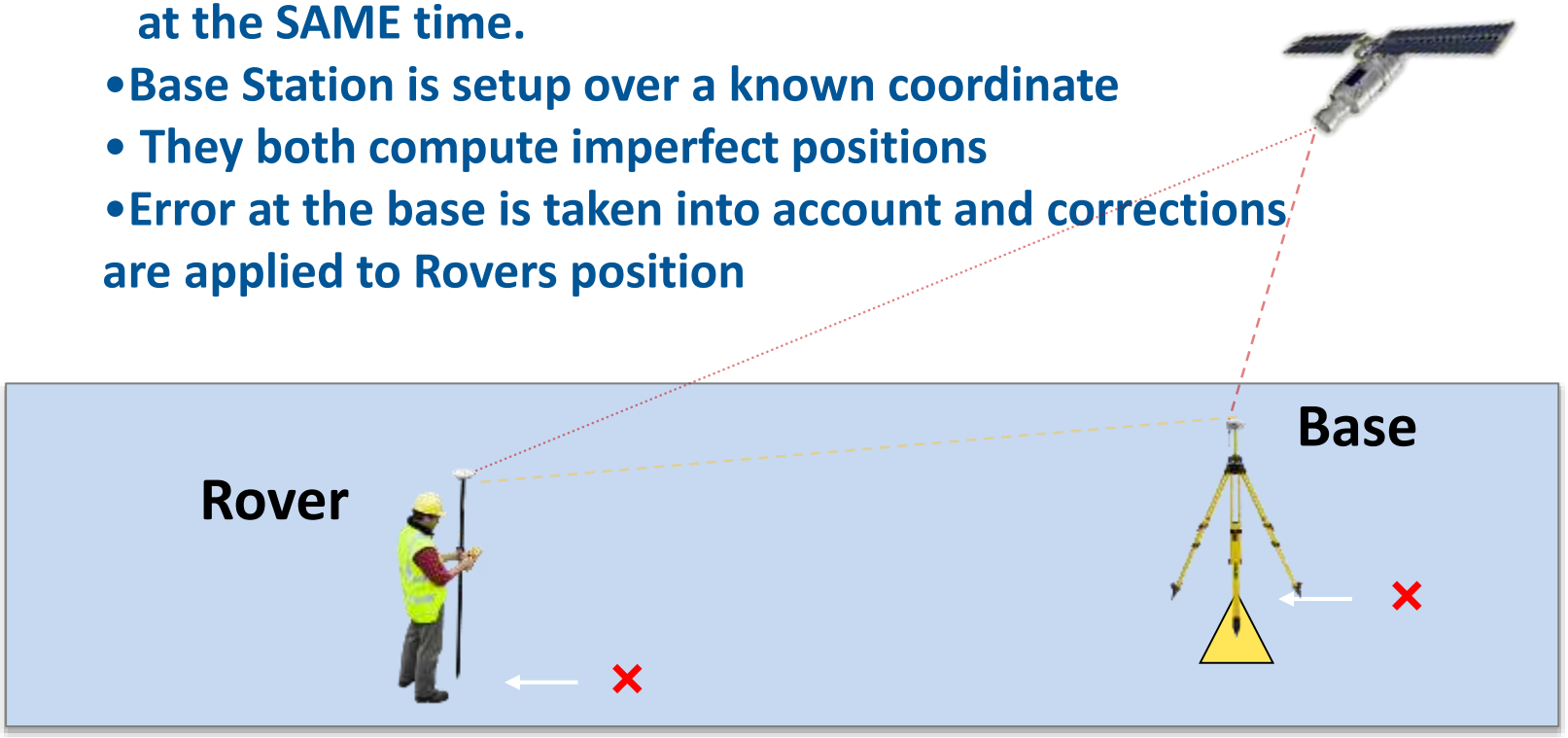
- How it works
- Post Processed GNSS
- Real-Time GNSS

How Differential Correction works:

It's a technique that allows us to remove timing errors caused by the atmosphere

Two receivers track the SAME signals and errors at the SAME time.

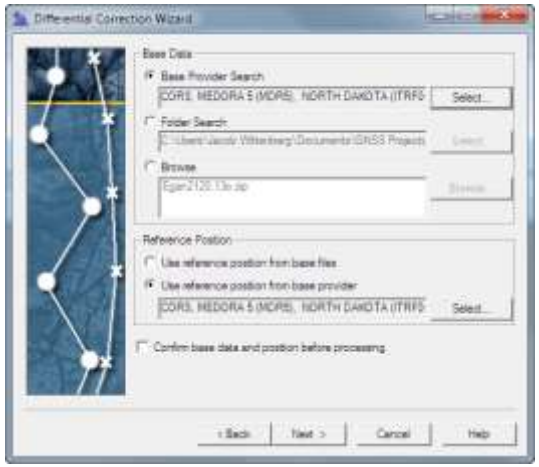
- Base Station is setup over a known coordinate
- They both compute imperfect positions
- Error at the base is taken into account and corrections are applied to Rovers position

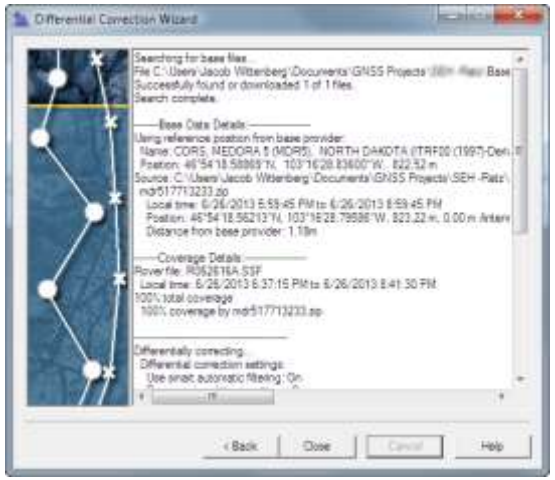


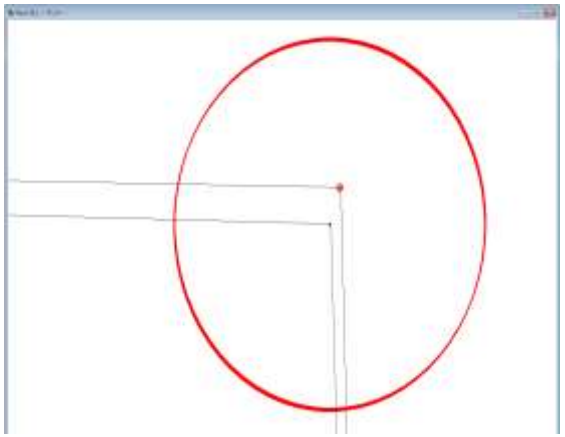
Post-processed Differential Correction

1. An Autonomous position is collected in the field.

2. Corrections are applied once back in the office.



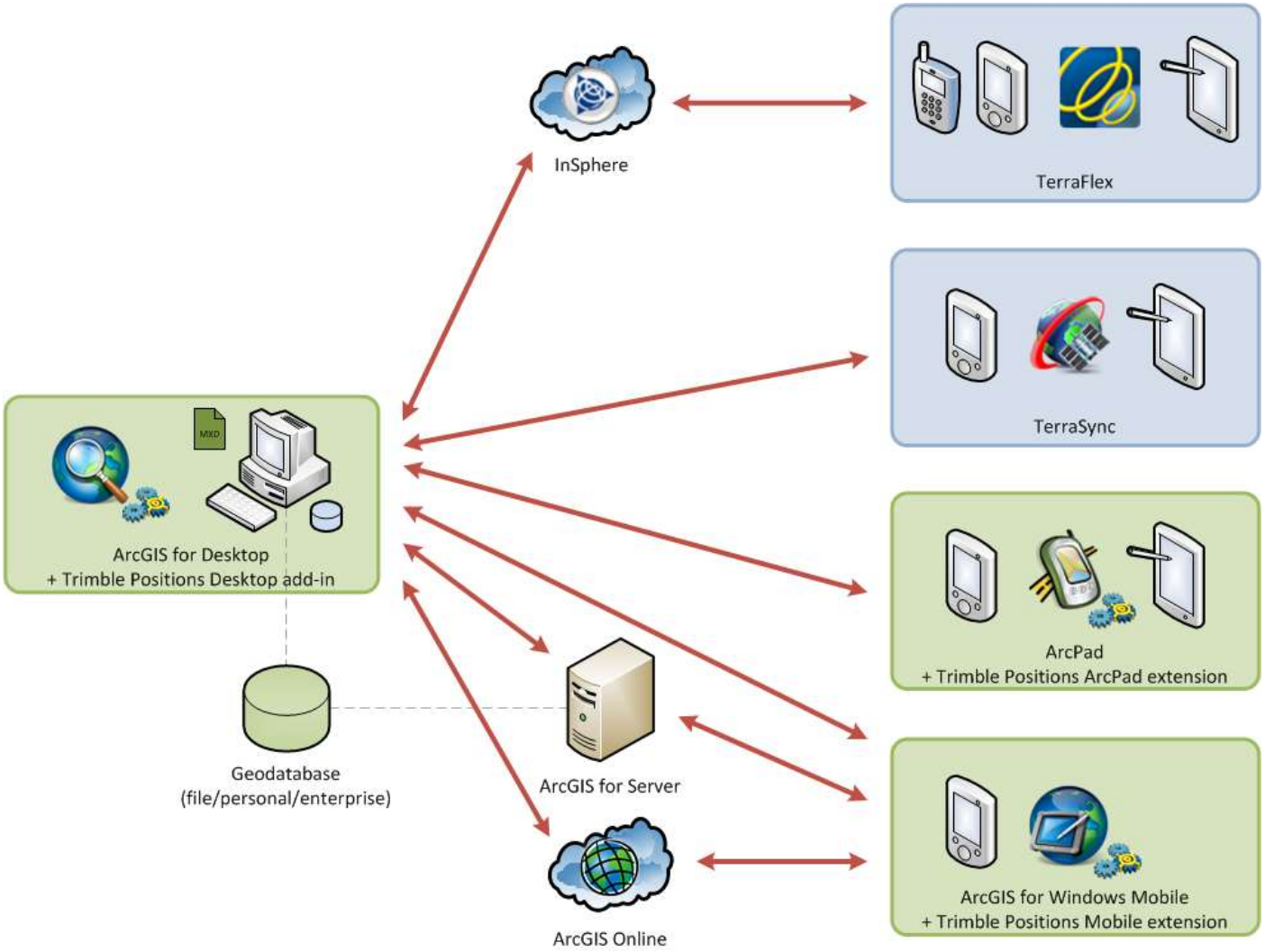




Post Processing Software

Trimble GPS Pathfinder Office
Trimble Positions for ArcGIS

Trimble Positions or GPS Pathfinder Office



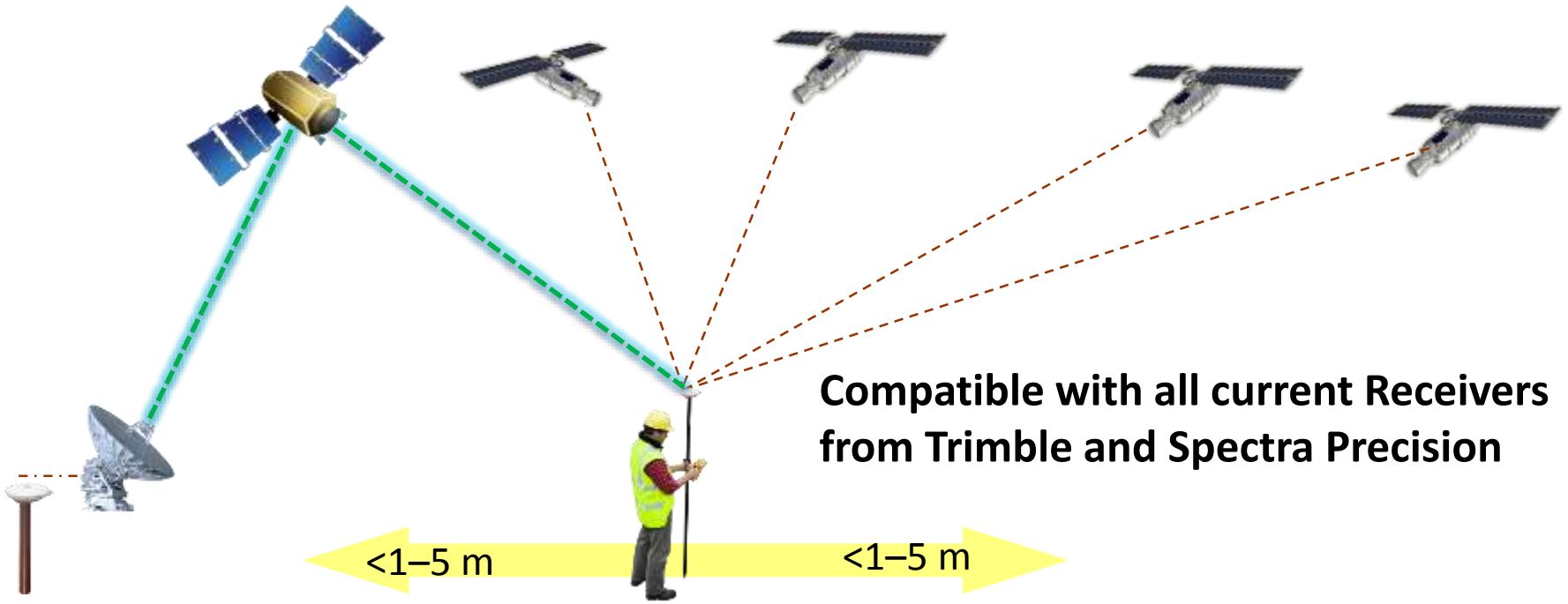
Free Available Base Stations

Sourced from **National Geodetic Survey Web Site:**
http://www.ngs.noaa.gov/CORS_Map/

What real-time sources are available?

- WAAS
- VRS
- RTX
- Plus more!!!

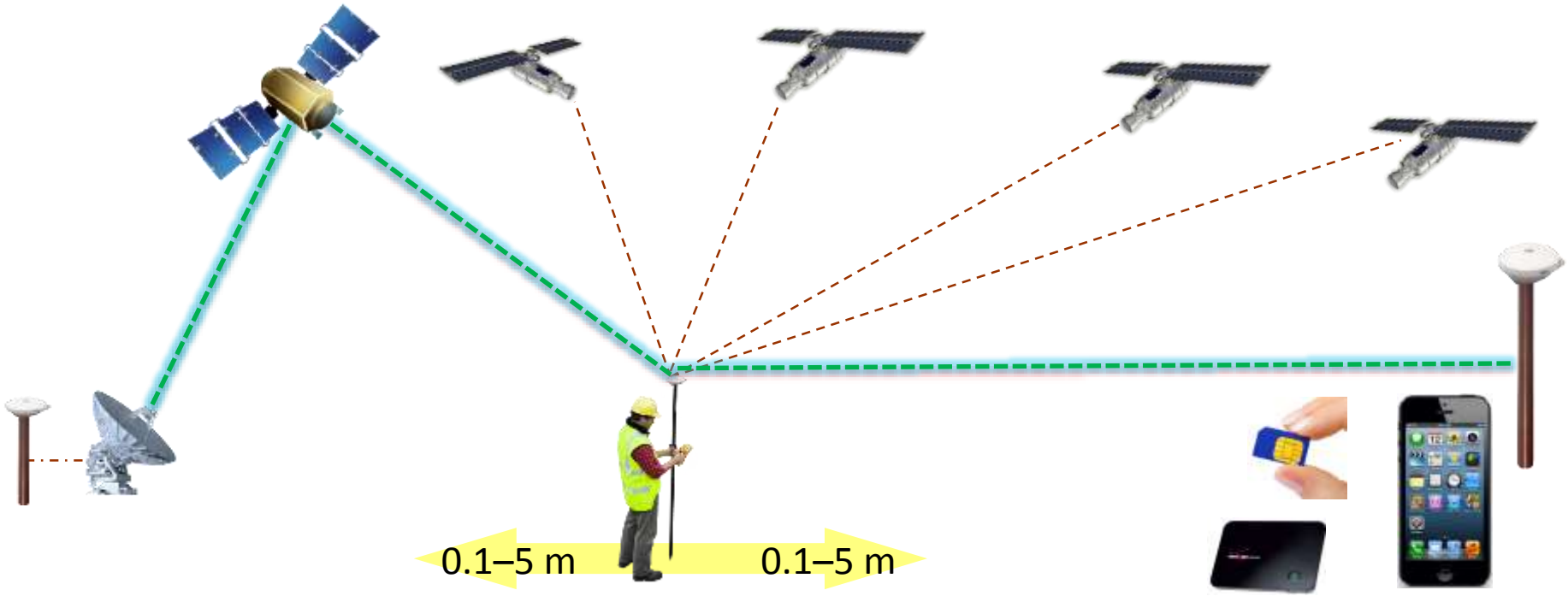
WAAS or “Integrated SBAS”



Compatible with all current Receivers from Trimble and Spectra Precision

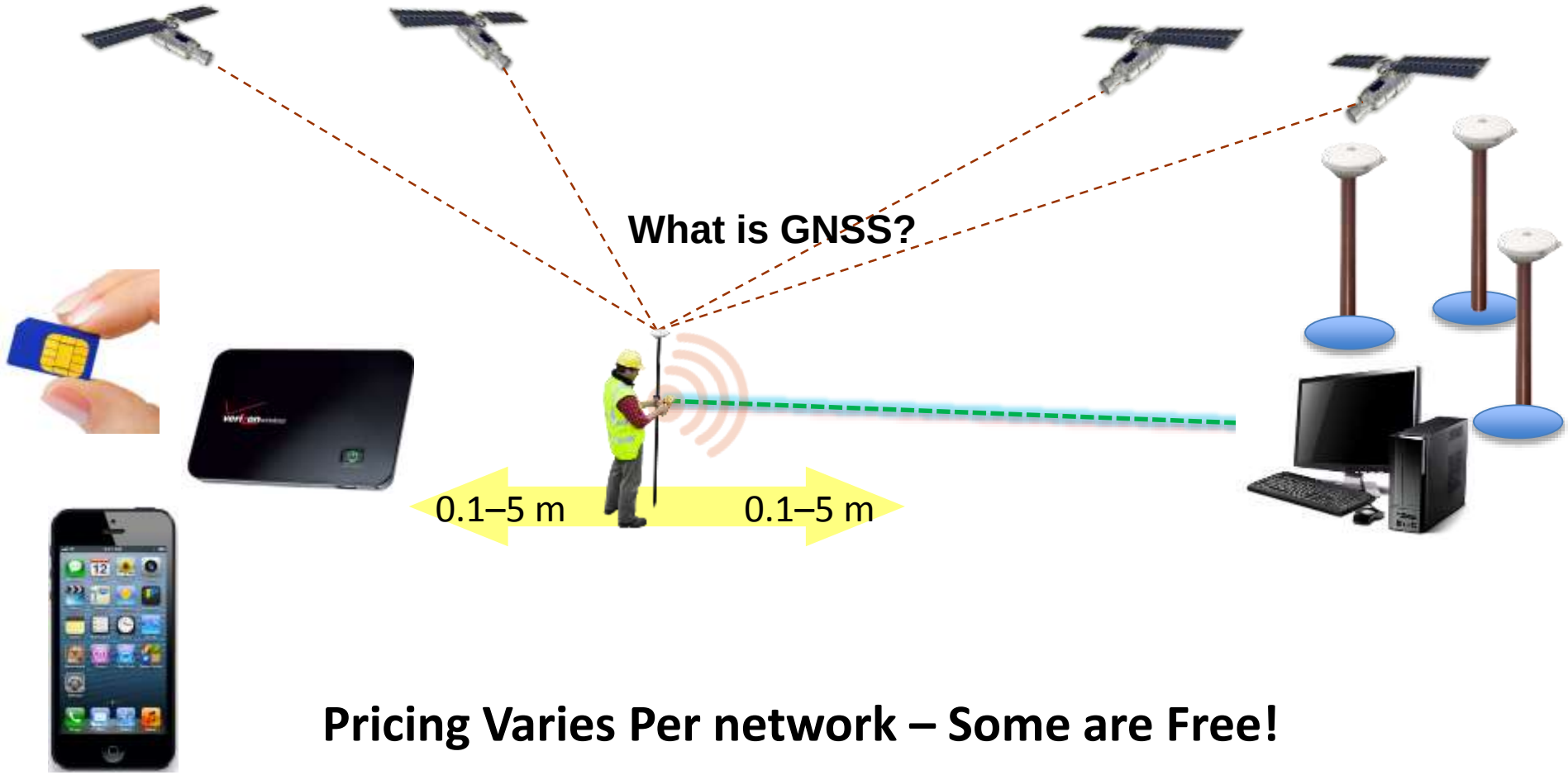
FREE – No Subscription Required

Trimble RTX Positioning Services



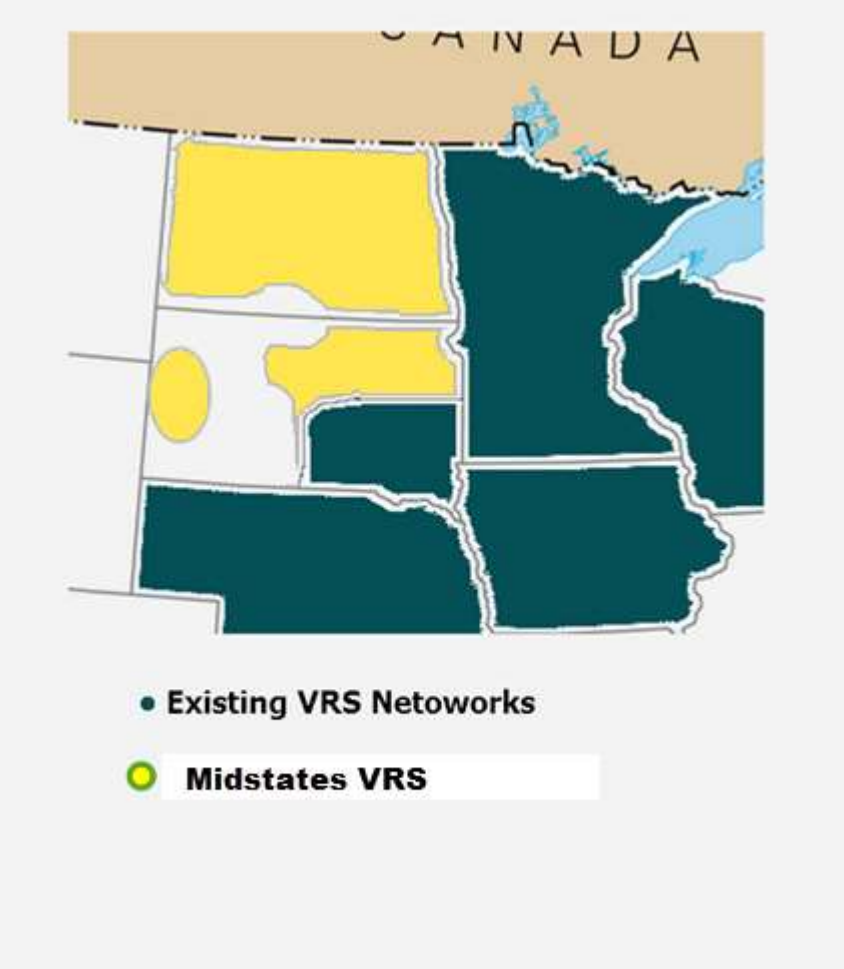
Subscription Based - Pricing Varies upon Service

VRS - Virtual Reference Station



Pricing Varies Per network – Some are Free!

VRS Networks Currently Available in:



Map denotes multiple available networks.

How can you add high accuracy real-time GNSS positioning to Smart Phones and Tablets?

Trimble R2

MM300

Trimble R1

Rugged R1 Receiver for Repeatable and Accurate Data Collection

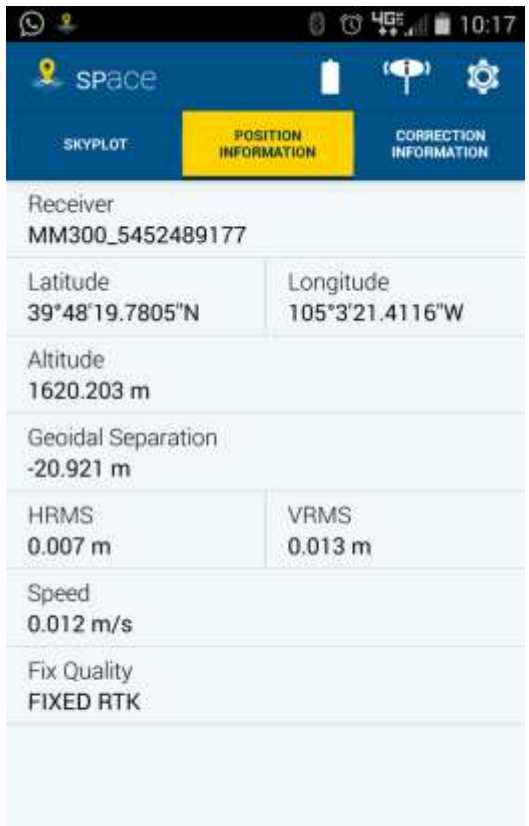
Works with iOS, Android, Windows Mobile 6.5x, or Windows OS

Rugged R2 Receiver for Repeatable and Accurate Data Collection

Works with iOS, Android, Windows Mobile 6.5x, or Windows OS

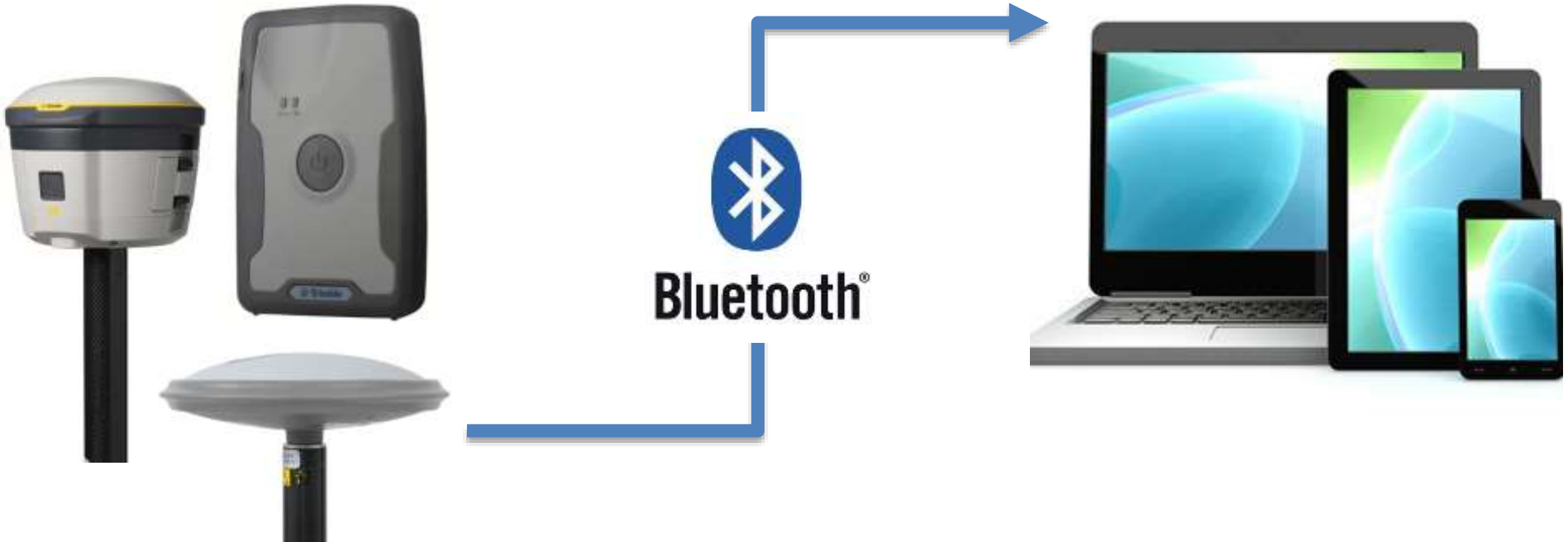
Spectra Precision Mobile Mapper 300 Receiver for Accurate Data Collection

Works with Android



How do they work?

- Create a Bluetooth Partnership (or USB with TRM Device for R2)
- Configure Real-time Corrections
- Automatically Overrides Positioning Services
- Third Party Applications can take advantage of High accuracy real-time positioning!



Device Support

O/S	TRM R1	TRM R2	SP MM300
Apple iOS	X	X	
Android	X	X	X
Windows 8-10	X	X	(Future Release)

Accuracy

Correction Source	TRM R1	TRM R2	SP MM300
WAAS	Submeter	~50CM	~50CM
VRS (or Single base)	Submeter	10 to ~1 CM	30 to ~1 CM
RTX	~50 CM	Submeter to 4cm*	5 CM

R1/R2 Works with Windows Mobile devices!

- Trimble TerraSync
- Trimble TerraFlex
- Trimble Positions With
  - Esri ArcPad
  - Esri ArcGIS Mobile
- GSE's GeoJot+
- ETC.

ESRI Collector and ArcGIS Online

Esri's Collector App, ArcGIS Online, or any app running on your Smart phone or tablet can take advantage of the receivers services.

Trimble R1 and R2 with the GNSS Status App

Correction Sources:
SBAS, DIRECT IP,
NTRIP (VRS), or RTX

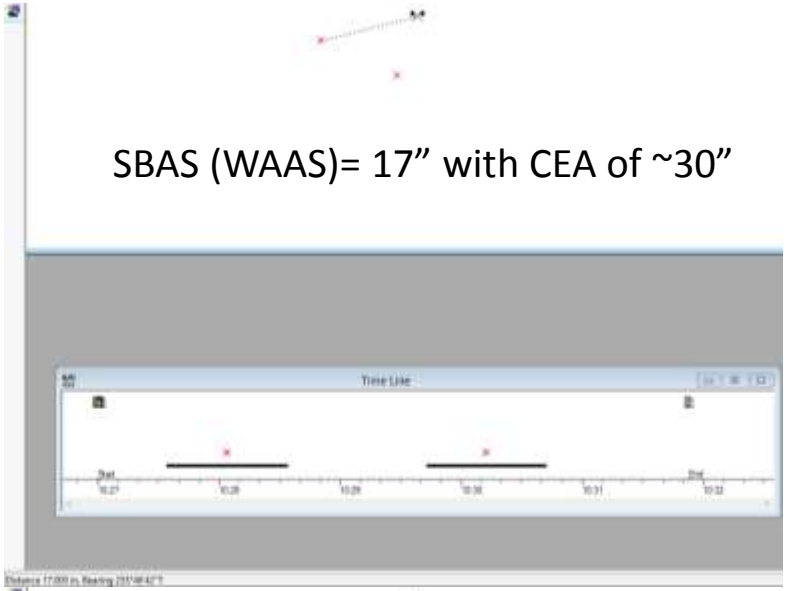
GNSS Status Utility App

Data Collection App…

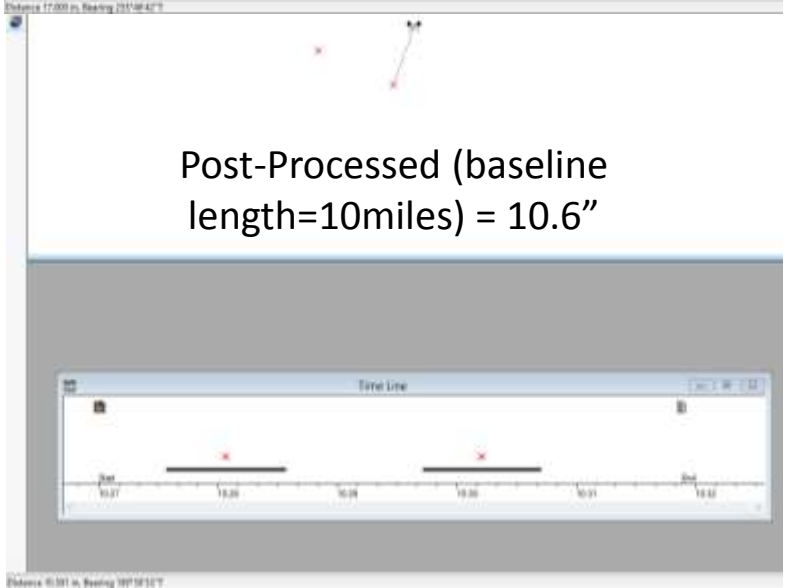
R1 Rugged Receiver with TerraSync and Pathfinder Office (PFO)

TerraSync 5.70

SBAS (WAAS)= 17” with CEA of ~30”



Post-Processed (baseline length=10miles) = 10.6”



Questions?

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